

Pervaporation of Volatile Organic Compounds

"Zenon's highly successful demonstration of pervaporation technology at Naval Air Station North Island in San Diego, California is an important milestone in the commercialization plan. These excellent results will be widely distributed by the U.S. Environmental Protection Agency and we expect a considerable response from industry and other government agencies that are facing similar problems with volatile organic compounds."

R.P. Canning
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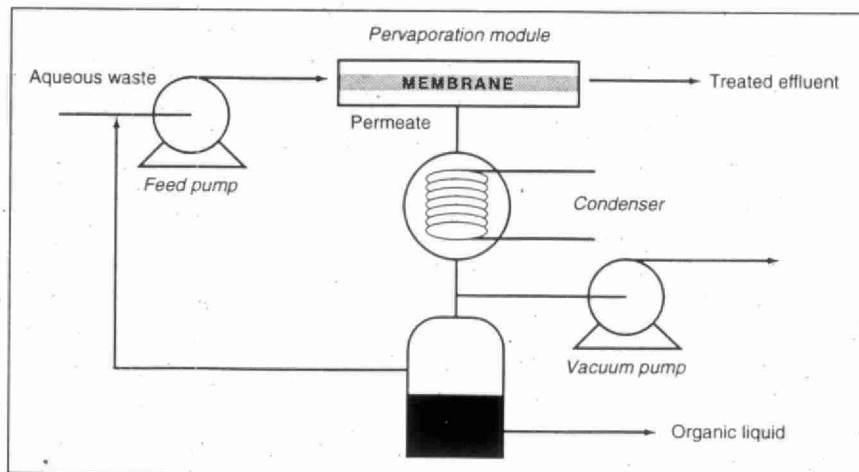


Figure 1 - Schematic of Process Train

THE COMPANY

Zenon Environmental Inc. is an advanced technology company which offers a comprehensive range of environmental services and systems to industries, consultants and governments. The company specializes in providing innovative and cost effective solutions to complex problems.

Zenon employs more than 200 people in Canada, the United States and Europe. The company's head office in Burlington, Ontario covers more than 45,000 square feet and includes a pilot plant for testing and a full-scale manufacturing facilities.

THE CHALLENGE

Volatile organic compounds (VOCs) are toxic and, in some cases, carcinogenic. About half of the priority pollutants named by the U.S. Environmental Protection Agency are VOCs. They are found in leachate, wastewater and contaminated groundwater as well as at abandoned industrial sites. VOCs are emitted in large quantities with estimates ranging from five million to 1.6 million metric tons per year from waste treatment, storage and disposal facilities. This is a clear indication that conventional technologies for treating waste water do not destroy, remove and contain VOCs.

VOC contamination occurs at various degrees of concentration. Testing shows that activated carbon and air stripping are cost effective and efficient methods for removing VOCs at low levels of concentration. The need now is for a technology that removes VOC's at high levels of concentration in groundwater, leachate and effluent.

TECHNOLOGY DESCRIPTION

Pervaporation is a new membrane process for removing VOCs from wastewater, leachate and contaminated groundwater. The membrane is made of a dense, organophilic polymer, such as silicone rubber. It allows the VOCs to pass through but only a little water.

In the pervaporation process, one side of this dense, polymeric membrane is exposed to the water containing the VOCs, while the other side is exposed to a vacuum. The membrane absorbs the VOCs and some water, drawing them both through to the other side where the vacuum draws them off.

At this point, the permeate, or the now highly concentrated VOCs and water mixture, usually separates into water and VOC's. This means that it is possible to recover the VOC's for uses in other industries, such as the solvent industry.

RESULTS

Zenon's pervaporation technology was demonstrated under the U.S. Environmental Protection Agency's SITE program at a former waste disposal site on the Naval Air Station North Island near San Diego, California. The groundwater at the site was contaminated with trichloroethene (TCE) and other organics. About two to 11 U.S. gallons/minute of groundwater containing concentrations of TCE ranging from 33 to 240 milligrams per litre flowed through the pervaporation unit. At those rates, the unit removed an average of 98 per cent of the TCE.

TECHNOLOGY OPPORTUNITIES

Zenon will continue to market its pervaporation technology by taking on more demonstration and full-scale groundwater remediation work. These will generate more opportunities for selling other pervaporation systems. Zenon hopes to be given the chance to return to the naval station near San Diego to begin full scale groundwater remediation work.

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PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

The demonstration of this technology was partially funded by the Ontario Ministry of Environment and Energy and Environment Canada under the Development and Demonstration of Site Remediation Technologies (DESRT) program.

Industrial companies located in Ontario may seek ministry/ industry services which will help them:

- * reduce, reuse and recycle solid waste;
- * effectively remediate historic pollution;
- * destroy hazardous contaminants;
- * reduce or eliminate liquid effluent and gaseous emissions;
- * use energy and water more efficiently.

Equipment and services supply companies can benefit from the information provided on technologies identified for business development.

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This project profile was prepared and published as a public service by the Ontario Ministry of Environment and Energy. Its purpose is to transfer information to Ontario companies about new environmental technologies.

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